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23 January 1957

TO : Project Headquarters

SUBJ: Report on R & D Tests

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This report is given in three sections:

I. Master Schedule with a status report on each piece of equipment.

II. Operational tests on equipment and techniques considered past the research testing phase.

III. Operational problems. Mainly personal observations on problems relating to U-2 development.

Information given in various parts of this report will be qualified as to source as deemed necessary.

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R & D Officer

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MASTER SCHEDULE

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TEST ITEM	A/C	PILOTS	LAG	C	FOG	JAN.	FEBRUARY	MARCH	APRIL
RAINBOW-HF	341	X				UNKNOWN			
RAINBOW-LF	343	X				UNKNOWN			
	360		X						
	362			X					
	343	X	X						
C CAMERA	367	X				C CAMERA			
	367	X							
DRIFT SIGHT I	367	X							
" II	364	X		X					
	351		X			TO "A"			
	369	X							
	372	X							
	376	X							
	366	X				TO FOG			
	368	X				TO FOG			
	369	X							
	370	X				TO FOG			
	371	X							
	372	X							
	373	X							
	376	X							

A/C:

TO A

TO FOG

TO FOG

TO FOG

TO FOG

TO "A"

TO FOG

TO FOG

TO FOG

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ASSEMBLY

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"C" CAMERA

One flight is completed on the "C" Camera. 1900 exposures were made at high altitude, however the shutter failed to operate. The film feeding mechanism did appear to operate normally.

we are on top of this now. → A housing for the camera has been fitted so that nitrogen can be used in the equipment bay to prevent frosting and contamination of the optical system.

Total weight of the camera and housing is now about seven hundred and fifty pounds. This has necessitated investigation of airplane center of gravity location for this configuration.

This still is a problem. Compatibility and boresighting with the drift sight control is now of importance and is being worked out. Estimated test completion: Unknown.

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Estimated test completion date unknown.

MK I AND II DRIFT SIGHT CONTROL

The improved Mk I drift sight accuracy tests are being accomplished by Detachment "C" and FOG pilots on navigation missions. A means of joint boresighting between the drift sight and the "C" Camera is now being studied by Perkin-Elmer and HYCON.

out for Aquatone

The Mk II drift sight control evidently received some bad publicity because of its initial test flight. This was undeserved. It checked out well on its second flight and tracked smoothly. No accuracy tests have been run, so it cannot be compared with the Mk I control as yet.

supplies meeting

There is evidently a desire for "hindsight", or a rearward looking periscope to be used at altitudes where contrails and other aircraft are to be found. The feelings of Project Headquarters on this subject are at present unknown.

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Estimated test completion date: Mk II, 1 Feb 57.

MK II TRACKER CAMERA

This simplified tracker camera has had two flights to date. The first was successful except the clock image could not be read. The second flight was unsuccessful because of improper film loading.

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Some trouble is experienced in reading the tracker clock because of a poor image combined with a blunt ended minute hand, making it hard to tell which minute it is pointing at. There are only two known clocks on the base; one is considered unreliable. These clocks should have 48 hour movements, be reliable, and easily read.

No trouble is expected with the Mk II tracker camera.

Estimated test completion, 1 Feb 57

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SECTION II, OPERATIONAL TESTS

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? MA-1 COMPASS

The high latitude feature of this compass has never been tested. A short test program has been initiated to determine its rate of precession when acting as a free gyro and to study means of correcting it with the sextant.

The compass seems satisfactory under normal conditions. Because of an evident change in magnetic variation at U-2 altitudes, C Detachment has used the sextant to calibrate their compasses rather than a ground compass rose. The variation at high altitude is about five degrees less than on the surface. It is not known whether this is true for other geographic locations.

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DRIFT SIGHT MK I ACCURACY TESTS

An attempt is being made to simplify accuracy tests so that all pilots can contribute data at the same time learn to properly operate the rate function of the sight control.

Pilots are asked to first set in known average ground speed and drift as shown from navigation data, as a first approximation. Then they are to pick up a target 60° forward, or with the control handle full back. They track this target and show on a sketch the target position when it is directly under the airplane; in other words the apparent target movement.

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By comparing this movement with the size of the square on the center of the scope, it should be simple to develop a "Rule of Thumb" to correct drift and ground speed settings for accurate tracking. This is not proposed as a design test of the drift sight, but as a development and training aid. Results to date are satisfactory.

WEATHER CONFIGURATION

No detailed information is kept here on mechanical functioning of this equipment; [] is in direct contact with NACA and Air Weather Service for this purpose. Weather flights are being flown at about 50,000 feet as requested. There are normally higher wind velocities at this altitude so we are testing navigation equipment and techniques in general on these flights.

The total number of weather configuration flights to date are 13.

SPEED WARNING SYSTEM

This system was designed to warn the pilot that he is at maximum indicated airspeed for his particular gust control position.

The test program on the system was satisfactory. With the gust control off, maximum smooth air speed is 220 knots indicated. At this speed the gear warning horn blows (the loudest and most aggravating horn I have ever heard, incidentally) and the speed brake is automatically actuated. If the pilot either slows to less than 220 or turns on his gust control, the horn and speed brake return to normal. At 260 knots indicated, only the warning horn is actuated. It stops below 260.

I believe this system to be desirable for all U-2 aircraft, since the U-2 can so easily and quickly exceed its critical speed, even at comparatively low power settings.

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SECTION III OPERATIONAL PROBLEMS

This information is added only as "fill in" material so that headquarters personnel will be better able to make decisions concerning [] activities.

On 17 January 1957, [] found an unforecast wind condition over Montana of about 104 knots from 337 degrees. Repeat flights since then to this general area show unusually high winds. However, the important point here is, I believe, that the winds on [] flight were not accurately forecast. This is mentioned not at all to reflect on the forecasters, but to show that it is unwise to assume dead reckoning is all that is required.

The SAC training people have always worried about U-2 crosswind landings but never considered it important enough to risk an airplane to gain more data. Improved ground control on our asphalt runway plus pilot proficiency have reduced this problem to one of minor importance, in my opinion. Pilots seem to agree that a good fast recovery will take care of up to a 15 knot crosswind.

still being worked on
A number of interested pilots and personal equipment technicians have done some fine work in an attempt to improve the MB-5 face plate for our pressure suit. This is an item of great importance; the emergency face heat is considered of primary importance. One MB-5 face plate has been modified to include all the required features. It will be tested here within a week.

Obtaining emergency face heat by simply operating a switch is the first thing pilots ask for, since most of us have had to fumble with the face heat wires at high altitude without an auto-pilot.

U-2 cruise data at 20,000 feet has been compiled and this altitude is now considered an emergency altitude for complete loss of oxygen. This will result in a cockpit pressure altitude of about 10,000 feet.

FOG pilot training has been nearly stopped because the lake was half covered with water until about a week ago when it froze and three inches of snow fell. The ice and snow remain. Of course runway operation goes on as usual. Outdoor maintenance is cold work with temperatures near or below freezing.

Rainbow flights are continuing as requested by []

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